

REMARKS

No amendments have been made to this application in this response.

No new matter is added to this application by this request for reconsideration.

Claims 1, 2, 5-9 and 11-15 are active.

ARGUMENTS

The claimed invention is directed to an organic electroluminescence device which comprises a cathode, an anode and a light emitting layer disposed between the cathode and anode. Such devices are used in many display applications where light emission in response to an electrical current is required. Improved display devices employing organic EL, having reduced energy requirements, better light emission efficiency and longer performance life are sought.

The presently claimed invention addresses this problem by providing an organic electroluminescence device as described in Claims 1 and 8 and the claims dependent thereon, as presented in the listing of claims in this paper. No such organic electroluminescence device is disclosed or suggested in the cited references. Moreover, Applicants have disclosed the novel compounds described in Claim 6, which are useful as light emitting materials. No such organic electroluminescence device as described in Claims 1 and 8 or light emitting materials as described in Claim 6 are disclosed or suggested in the cited references.

The rejection of Claims 6, 7, 14 and 15 under 35 U.S.C. 102(b) over Shi et al. (EP 1,009,044) is respectfully traversed.

Shi does not disclose a light emitting material as disclosed in Claim 6 or an organic electroluminescence device comprising the light emitting material of formula (2).

Shi is directed to an organic multilayer electroluminescent device including an anode and cathode and including therebetween a hole transport layer and an electron transport layer disposed in operative relationship with the hole transport layer. Shi states:

“It is an object of the present invention to provide organic compounds outside the class of aromatic amines as the hole transport layer in organic EL devices, which result in enhanced EL performance.” [0009]

Shi indicates in [0014] that the “hole transport layer in accordance with the present invention effectively works with the electron transport layer or an emissive layer or an electron transport layer which also functions as an emissive layer to provide a highly efficient electroluminescent device.” Therefore, Applicants respectfully submit that Shi clearly describes that the **hole transport layer is not an emissive component** in the reference electroluminescent device.

The Office has cited formulae (I), (VI), (VII), (X) and (XI) from Shi, to show anthracene derivatives according to Claim 6 of the present invention. Applicants respectfully maintain that Shi describes these materials only as **hole transport components** and nowhere does the reference disclose or suggest an organic electroluminescence device wherein the anthracene materials of formulae(I), (VI), (VII), (X) and (XI) are components of an emissive layer or that these materials can be used for such purpose.. However, the organic electroluminescence device of the claimed invention describes the anthracene derivatives represented by formula (2) as **light emitting materials which are present in the light emitting layer of the claimed** organic electroluminescence device.

Moreover, Applicants respectfully submit that each of the cited formulae are generic structures representing a large genus of a vast number of chemical structures. In this regard, Applicants direct the Office’s attention to *In re Petering*, 301 F.2d 676, 133 USPQ 275 (CCPA 1962) which states:

“The generic formula of Karrer, . . . , encompasses a vast number and perhaps even an infinite number of compounds since there is no express limit on the size of the alkyl group or the structure and size of R. Even though appellants’ claimed compounds are encompassed by this broad generic disclosure, we do not think this disclosure by itself describes appellants’ invention, as defined by them in any of the appealed claims, within the meaning of 35 U.S.C. 102(b).”

Applicants have stated the following relative to formulas (1) and (2) on page 3, lines 14-20, in the specification:

“As a result of intensive studies by the present inventors to achieve the above object, it was found that an EL device exhibiting a great efficiency of light emission and has a long life could be obtained when a compound having **an anthracene structure having a specific asymmetric structure represented by general formula (1) or (2)** shown below is used as the light emitting material of an organic EL device.” (Bold added)

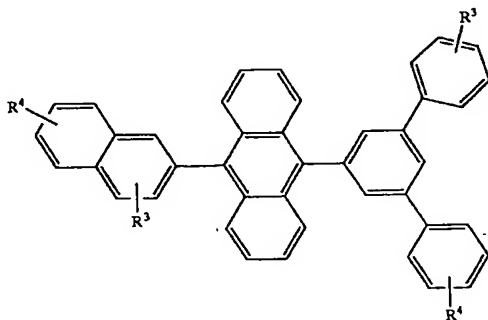
Applicants respectfully submit that structural formula I as indicated and defined by the cited reference describes an almost limitless range of symmetric and asymmetric compounds, with no disclosure or suggestion of a preferred asymmetric structure, and therefore, in accordance with *In re Petering* cannot anticipate the claimed invention.

Applicants respectfully submit that Shi formulae X and XI are broadly described and even though a specie of formula I, remain generic relative to formula (2) of the claimed invention. Applicants note that in both formulae, R³ is “hydrogen, alkyl of 1 to 24 carbon atoms; aryl or substituted aryl of from 5 to 20 carbon atoms; or heteroaryl or substituted heteroaryl of from 5 to 24 carbon atoms; or fluorine, chlorine, bromine; or cyano group.”
[0011]

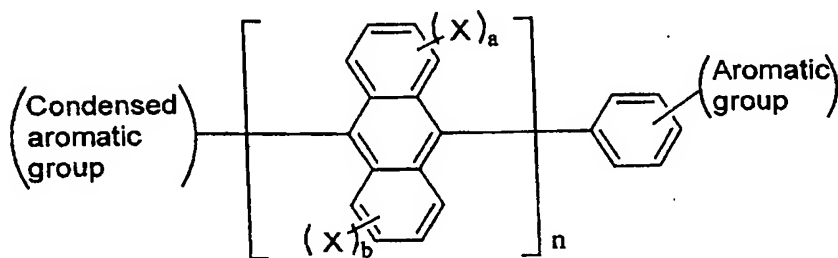
In contrast, Ar’ in the claimed invention is a substituted or unsubstituted aromatic group having 6 to 50 nuclear carbon atoms. Applicants respectfully point out that Shi does not disclose any specific compounds according formulae X and XI and, in addition, no preferred description narrowing these formulae is provided.

In view of the above, Applicants respectfully submit that in accordance with *In re Petering* the Shi formulae X and XI cannot anticipate the claimed invention.

Compounds 47, 48, 50, 51, 52, 54, 55, 56 and 57 of Shi have been cited. Applicants respectfully submit that these compounds all have the following general structure:



In contrast, the anthracene derivative of Claim 6 is represented by the formula:



Applicants respectfully submit that the compounds from the cited reference requires two substituent aryl groups on the phenyl ring attached to the anthracene moiety. In contrast,

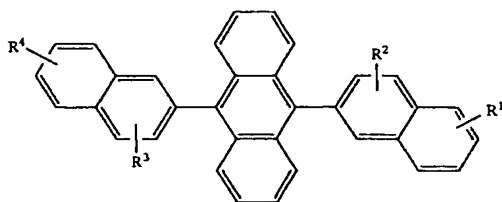
the compounds according to formula (2) of the claimed invention has one aromatic substituent on the phenyl ring attached to the anthracene moiety.

In view of the above, Applicants respectfully submit that the cited reference cannot anticipate or render obvious the claimed invention and withdrawal of the rejection of Claims 6, 7, 14 and 15 under 35 U.S.C. 102(b) over Shi et al. (EP 1,009,044) is respectfully requested.

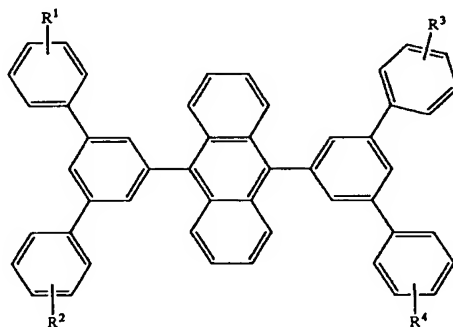
The rejection of Claims 1, 2, 4-9 and 11-15 under 35 U.S.C. 103(a) over Shi et al. (U.S. 5,935,721), in view of Shi et al. (U.S. 5,972,247) is respectfully traversed.

The cited references in combination, neither disclose, suggest or provide motivation to one of ordinary skill in the art which would lead to the claimed invention.

Shi ('721) describes **symmetric** 9,10-di-(2-naphthyl)anthracene derivatives of the formula:



Shi ('247) describes **symmetric** 9,10-di-(3',5'substituted-phenyl)anthracene derivatives of the formula:



The Office has alleged that it "would have been obvious to one of ordinary skill in the art based on substituted dinaphthyl anthracene (N-A-N) derivatives used as blue emissive

materials for the light emitting layer of an electroluminescent device and substituted diphenyl anthracene (P-A-P) derivatives [[of]] used a[s] blue emissive materials for the light emitting layer of an electroluminescent device that the replacement of one of the naphthyl groups of Shi '721 with a substituted phenyl group of Shi '247 would result in a 9,10-disubstituted anthracene compound (N-A-P) that would also have similar fluorescent properties as emissive materials for the light emitting layer of an electroluminescent device.”

Shi ('247) describes the very good film forming properties of the symmetric 9,10-bis(3',5'-diaryl)phenyl anthracenes (Col. 2, line 55 to Col. 3, line 4) and provides no suggestion or motivation that would lead one to a 9,10 asymmetric substituted anthracene according to the claimed invention.

Shi ('721) describes the bright blue emission and long operational stability of the symmetric 9,10-di-(2-naphthyl)anthracene derivatives (Col. 2, lines 55-67) and similar to Shi ('247) provides no suggestion or motivation that would lead one to a 9,10 asymmetric substituted anthracene according to the claimed invention.

In Comparative Example 1 of the present application, performance results for structure an1 are presented (Table 1, p63).

Compound AN5, as presented in Example 13 of the present invention would be derived by combining Compound 1 of Shi ('721)(Col. 7) with Compound 1 of Shi ('247) as alleged by the Office. The Examiner has indicated that AN5 would be expected to have similar fluorescent properties to those of Shi ('721). Surprisingly, as indicated in Table 1, Compound AN5 of the claimed invention **shows a greater than 20% improvement** in efficiency of light emission (11.0 cd/A compared to 9.0 cd/A).

Applicants respectfully call the Examiner's attention to the following excerpt from the Office's own discussion of **“Examination Guidelines for Determining Obviousness Under**

35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*

“The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention.”⁴³ “[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.”⁴⁴ **If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art,**” (Federal Register, Vol. 72, No. 195, page 57529) **(Bold added)**

Applicants respectfully submit that the cited references do not disclose asymmetric structures according to the claimed invention and nowhere in either reference is there a suggestion of an asymmetric 9,10-disubstituted anthracene as according to the claimed invention. Moreover, nowhere does either reference, alone or in combination with the other, provide motivation that would lead one of ordinary skill in the art to the presently claimed invention or that would suggest an improvement in efficiency of light emission as described above. Accordingly, Applicants respectfully submit that in view of the KSR guidelines above, a conclusion of obviousness cannot be supported. Withdrawal of the rejection of Claims 1, 2, 4-9 and 11-15 under 35 U.S.C. 103(a) over Shi et al. (U.S. 5,935,721), in view of Shi et al. (U.S. 5,972,247) is respectfully requested.

The rejection of Claims 1, 2, 4, 8, 9 11 and 13 under 35 U.S.C. 103(a) over Shi (EP 1,009,044) in view of Shi ('721) and Shi ('247) is respectfully traversed.

Applicants have described the failure of each cited reference to disclose or suggest the light emitting material according to formula (1) according to the presently claimed invention or formula (2) as described in Claim 6. Shi (EP) is directed to a material for a hole-transport layer.

The Office has alleged:

“One of ordinary skill in the art would recognize that a N-A-P substitution pattern, as in Shi(EP), would result in compounds having similar fluorescent properties that would be useful as emissive materials as suggested in paragraph [0035] of Shi(EP) and taught for the anthracene derivatives of Shi '721 and Shi '247.”

However, Applicants respectfully submit that [0035] of Shi (EP) describes characteristics of a dopant for an emissive layer in an EL device, the objective of that reference and not an emissive material as described in Shi ('721 and '247). Moreover, Applicants have described above that the structures disclosed in Shi (EP) do not anticipate or render obvious the claimed invention with respect to formulae (1) and (2).

Furthermore, Applicants have shown that the 9,10 asymmetric di-substituted anthracene compounds according to the claimed invention have significantly improved operational half lives as emissive materials in an EL device in comparison to symmetric di-substituted anthracene compounds. The data for Examples 5, 6, 7, 8, 14 and 15 according to the claimed invention and Comparative Examples 1 and 2 is shown in the following Table.

Table

Example No.	Structure	Efficiency (cd/A)	Half life (hours)
5	AN 8	11.2	4200
6	AN 10	11.0	4,000
7	AN 28	10.9	3,700
8	AN 30	10.8	3,700
9	AN 8	10.6	3,200
13	AN 5	11.0	2,200
14	AN 7	11.3	4,500
15	AN 49	11.3	4,500
Comp. 1	an 1	9.0	2,200
Comp. 2	An 2	8.8	1,100

As indicated in the above Table, the EL devices prepared with 9,10 asymmetric di-substituted anthracene compounds according to the claimed invention show significantly improved light emission efficiency and generally have half lives which are significantly longer than the symmetric structures of the comparative examples. Such improved performance is nowhere disclosed or suggested in any of the cited references.

In view of the above, Applicants respectfully submit that the cited combination of references cannot render the claimed invention obvious and withdrawal of the rejection of Claims 1, 2, 4, 8, 9 11 and 13 under 35 U.S.C. 103(a) over Shi (EP 1,009,044) in view of Shi ('721) and Shi ('247) is respectfully requested.

The rejection of Claims 5 and 12 under 35 U.S.C. 103(a) over Shi (EP 1,009,044) in view of Shi ('721) and Shi ('247) and further in view of Ikeda et al. (JP 2001-097897) and

over Shi ('721) in view of Shi ('247) and further in view of Ikeda et al. is respectfully traversed.

The cited combination of references neither discloses nor suggests the presently claimed invention as described in Claims 5 and 12.

Claims 5 and 12 depend from Claims 1 and 8, respectively. The deficiency of each of the cited combinations of Shi references relative to the independent claims is described above. Ikeda does not cure this deficiency.

Ikeda is cited to show use of a styryl amine in an EL device. However, Applicants respectfully submit that the Ikeda does not disclose or suggest an organic electroluminescence device wherein anthracene derivatives according to the presently claimed invention are light emitting materials of the light emitting layer, and therefore, the cited reference cannot cure the deficiency described above for each of the Shi references.

Accordingly, in view of the above discussion, Applicants respectfully submit that the combination of the cited references cannot render the claimed invention obvious.

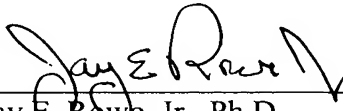
Withdrawal of the rejection of Claims 5 and 12 under 35 U.S.C. 103(a) over Shi (EP 1,009,044) in view of Shi ('721) and Shi ('247) and further in view of Ikeda et al. and over Shi ('721) in view of Shi ('247) and further in view of Ikeda et al. is respectfully requested.

Applicants respectfully request that the provisional rejection of Claims 1, 2, 4-9 and 11-15 on the ground of nonstatutory obviousness-type double patenting over copending Application No. 11/282,818, be held in abeyance pending identification of allowable subject matter. Applicants respectfully note that the above-identified application has an effective filing date of August 18, 2003, which is earlier than the effective filing date of May 19, 2005 of Application No. 11/282,818. (MPEP § 804 I.B.1.)

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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